



# UNITED STATES PATENT AND TRADEMARK OFFICE

AN  
UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/047,728	01/15/2002	Terry R. Bussear	284-15718-US	5186
24923	7590	10/24/2003	EXAMINER	
PAUL S MADAN MADAN, MOSSMAN & SRIRAM, PC 2603 AUGUSTA, SUITE 700 HOUSTON, TX 77057-1130			MCLOUD, RENATA D	
		ART UNIT	PAPER NUMBER	
		2837		

DATE MAILED: 10/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/047,728	BUSSEAR ET AL.	
	Examiner Renata McCloud	Art Unit 2837	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 25 July 2003.

2a) This action is FINAL.                  2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-7 and 9-36 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-7 and 9-36 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____	6) <input type="checkbox"/> Other: _____

## DETAILED ACTION

### ***Response to Amendment***

1. In response to the amendment filed 25 July 2003, paper number 10, the following has occurred:

- (a) The claim objections have been withdrawn by the examiner due to the changes made by the applicant.
- (b) The 35 U.S.C. 112 rejection has been withdrawn by the examiner due to the changes made by the applicant.
- (c) Claims 1,9-12,17,18,20,23, and 25 have been amended.
- (d) Claim 8 has been cancelled.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith (U.S. Patent 4,802,143).

**Claim 18:** Smith teaches a method for inducing seismic energy in a formation penetrated by a wellbore, comprising: coupling a tubular string (Fig. 1:1) between a downhole anchor (Fig. 11:62) and a surface vibratory source (Fig. 1:10; Col. 7:20-27 teaches that 10 revolves with the pipe for transmitting pipe strain, Col. 8:5-7 teaches

that pipe strain is in the form of acoustic waves); vibrating the tubular string to generate a seismic wave in the formation at the anchor (Col. 8:21-30); determining a subsurface characteristic of the formation from detected seismic energy (e.g. Col. 7: 40-49).

**Claim 19:** Smith teaches the limitations of claim 18. Referring to claim 19, Smith also teaches at least one sensor measuring a parameter of interest (Fig. 1:9), wherein the parameter of interest is one of (i) load on the anchor; (ii) load on the tubular string proximate the vibratory source; (iii) vibratory motion of the anchor; or (iv) vibratory motion of the tubular string proximate the vibratory source (Col. 7:32-40, measures pipe strain).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-7, 12,13,15-17, 21-24, 26, and 33-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (U.S. Patent 4,802,143) in view of Cretin (U.S. Patent 4,802,143).

**Claim 1:** Smith teaches an apparatus for inducing seismic energy in a formation penetrated by a borehole, comprising: an anchor device in a borehole at a selected location (Fig. 11:62); and a vibratory source at a surface location coupled to the anchor

causing the anchor to impart seismic energy into the formation (Fig. 1:10; Col. 7:20-27 teaches that 10 revolves with the pipe for transmitting pipe strain, Col. 8:5-7 teaches that pipe strain is in the form of acoustic waves); and a control unit (e.g. Fig. 1:16 has a pressure transducer 12; Col. 7:27-31) for controlling the vibratory source and for determining a subsurface characteristic of a formation (e.g. Col. 7: 40-49). Smith does not teach an anchor device engaged with the borehole at a selected location. Cretin teaches an anchor device engaged with the borehole at a selected location (e.g. Fig. 1:10).

**Claim 12:** Smith teaches a system for obtaining seismic data, comprising: an anchor device in a wellbore at a selected location; a vibratory source at a surface location coupled to the anchor causing the anchor to induce seismic energy into the formation (e.g. Fig. 1:10; Col. 7:20-27 teaches that 10 revolves with the pipe for transmitting pipe strain, Col. 8:5-7 teaches that pipe strain is in the form of acoustic waves); and at least one detector placed spaced-apart from the anchor, to detect seismic signals responsive to seismic energy imparted in the formation by the anchor (e.g. Fig. 1:16). Smith does not teach an anchor device engaged with the borehole at a selected location. Cretin teaches an anchor device engaged with the borehole at a selected location (e.g. Fig. 1:10).

**Claim 23:** Smith teaches a method for obtaining seismic data, comprising: an anchor (e.g. Fig. 11:62) in a wellbore (e.g. Fig. 1:3) in a subsurface formation at a selected downhole location; coupling the anchor to a surface located vibratory source (e.g. Fig. 3:62 coupled to 10 {Fig. 1:10; Col. 7:20-27 teaches that 10 revolves with the

pipe for transmitting pipe strain, Col. 8:5-7 teaches that pipe strain is in the form of acoustic waves}); energizing the vibratory source to impart seismic energy through the anchor to the formation (e.g. Col. 8:21-30); and sensing the seismic energy by at least one detector spaced-apart from the anchor (e.g. Fig. 1:16); and determining a subsurface characteristic of the formation from detection of the seismic energy imparted into the formation (e.g. Col. 7: 40-49). Smith does not teach engaging an anchor device in a wellbore. Cretin teaches an anchor device engaged with the borehole at a selected location (e.g. Fig. 1:10).

*It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus taught by Smith to make the anchor device engaged with the borehole as taught by Cretin. The advantage of this would be secure fastening of the apparatus to the borehole while seismic energy is being transmitted.*

**Claim 2:** Smith and Cretin teach the limitations of claim 1. Referring to claim 2, Smith teaches a power source to drive the vibratory source (e.g. Fig. 1:11).

**Claim 3:** Smith and Cretin teach the limitations of claim 1. Referring to claim 3, Smith teaches the power source is selected from a group consisting of (i) a hydraulic unit; (ii) an electrically operated device; and (iii) a pneumatic device (e.g. Col. 8:1-5, an electrical device).

**Claim 4:** Smith and Cretin teach the limitations of claim 1. Referring to claim 4, Smith teaches at least one sensor to provide a measure of a parameter of interest (e.g. Fig. 1:9).

**Claims 5, 7 and 22:** Smith and Cretin teach the limitations of claims 1 and 12.

Referring to claims 5, 7, and 22, Smith teaches the parameter of interest is one of: motion of the anchor; load on the anchor; load on a tubular string coupled between the anchor and the vibratory source; and motion of the tubular string (e.g. Col. 7:32-40, measures pipe strain-load on tubular string).

**Claims 6 and 21:** Smith and Cretin teach the limitations of claims 1 and 12.

Referring to claims 6 and 21, Smith teaches a first sensor proximate the anchor to measure a selected parameter of interest (e.g. Fig. 1:9); and a second sensor spaced-apart from the first sensor measuring the parameter of interest to determine transmissibility of power from the vibratory source to the anchor (e.g. Fig. 1:16).

**Claims 13 and 24:** Smith and Cretin teach the limitations of claims 12 and 23.

Referring to claims 13, and 24, Smith teaches a control unit to control the operation of the vibratory source (e.g. Fig. 1:12).

**Claims 15 and 26:** Smith and Cretin teach the limitations of claims 12 and 23.

Referring to claims 15 and 26, Smith teaches the at least one detector (e.g. Fig. 1:16) is placed at a location selected from one of surface location; a location in the borehole; a secondary borehole formed spaced-apart from the borehole; or a secondary borehole that forms a part of a multibore system containing the borehole (e.g. Fig. 1:16 is at a surface location).

**Claim 16:** Smith and Cretin teach the limitations of claim 12. Referring to claim 16, Smith teaches at least one detector includes a plurality of spaced apart detectors (e.g. Fig. 8:8).

**Claim 17:** Smith and Cretin teach the limitations of claim 13. Referring to claim 17, Smith teaches the control unit processes the signals detected by at least one detector (e.g. Fig. 1:16 processes signals from 8).

**Claims 33 and 34:** Smith and Cretin teach the limitations of claims 12 and 23. Referring to claims 33 and 34, Smith teaches the at least one detector is a geophone (e.g. Col. 7:19-21)

**Claim 35:** Smith teaches the limitations of claim 12. Referring to claim 35, Smith does not teach the at least one anchor including a plurality of fixed anchors located at a corresponding plurality of predetermined locations. Cretin et al teach a plurality of fixed anchors located at a corresponding plurality of predetermined locations (e.g. Fig. 1:10). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus taught by Smith to include a plurality of anchors as taught by Cretin et al. The advantage of this would be improved anchorage of the drilling apparatus.

**Claim 36:** Smith teaches the limitations of claims 23. Referring to claim 36, Smith does not necessarily teach the repeating the steps of claim 23. Cretin et al teach repeating an acquisition cycle during lowering at given time periods (e.g. Col. 8:25-30). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus taught by Smith to repeat the process as taught by Cretin et al. The advantage of this would be improved detection of seismic signals.

6. Claims 9-11, 14,25, 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith and Cretin as applied to the claims 1, 12, and 23 above, in view of Nelson (U.S. Patent 4,188,610).

**Claim 9:** Smith and Cretin teach the limitations of claim 1. Referring to claim 9, they do not teach the control unit includes a computer. Nelson teaches the control unit includes a computer (e.g. Col. 22:46-51).

**Claim 10:** Smith and Cretin teach the limitations of claim 1. Referring to claim 10, Smith and Cretin do not teach the control unit controls frequency of vibration of the vibratory source in response to the sensed parameter of interest. Nelson teaches the control unit controls frequency of operation of the vibratory source in response to the sensed parameter of interest (e.g. Col. 21:54-22:10).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus taught by Smith and Cretin to include a computer and make the control unit control the frequency of operation as taught by Nelson. The advantage of this would be an apparatus that can be programmed to generate and measure seismic signals.

**Claim 11:** Smith, Cretin, and Nelson teach the limitations of claim 10. Referring to claim 11, Nelson teaches the control unit controls the frequency of vibration in accordance with programmed instructions provided to the control unit (e.g. Col. 21:54-22:10).

**Claims 14 and 25:** Smith and Cretin teach the system of claims 13 and 23.

Referring to claims 14 and 25, they do not necessarily teach the control unit controls the vibratory source in response to the signals detected by at least one detector. Nelson teaches the control unit controls the vibratory source in response to the signals detected by at least one detector (e.g. Col. 21:54-22:2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system taught by Smith and Cretin to control the vibratory source in response to detected signals as taught by Nelson. The advantage of this would be a system with linear coupling between the source and the earth.

**Claim 27:** Smith and Cretin teach the limitations of claim 12. Referring to claim 27, Smith teaches the anchor device is a slip anvil, the slip anvil adapted to act cooperatively with a driver coupled to the vibratory source (e.g. Fig. 3:62). Smith and Cretin do not teach the slip anvil adapted to act cooperatively with a driver coupled to the vibratory source to generate a broadband seismic signal in the formation when said driver impacts said slip anvil. Nelson teaches a slip anvil adapted to act cooperatively with a driver coupled to the vibratory source to generate a broadband seismic signal in the formation when said driver impacts said slip anvil (e.g. Col. 7:23-40).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system taught by Smith and Cretin to control the vibratory source in response to detected signals as taught by Nelson. The advantage of this would be a system with linear coupling between the source and the earth.

**Claims 28 and 31:** Smith and Cretin teach the limitations of claims 12 and 23.

Referring to claims 28 and 31, they do not teach the seismic energy is one of (i) a single frequency and (ii) a swept frequency. Nelson teaches the seismic energy is a swept frequency (e.g. Col. 7:35-40).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system taught by Smith and Cretin to make the seismic energy a swept frequency as taught by Nelson. The advantage of this would be a reduction in undesired harmonic undulations.

**Claims 29 and 32:** Smith and Cretin teach the limitations of claims 12 and 23.

Referring to claims 29 and 32, they do not teach the seismic energy is a broadband signal. Nelson teaches the seismic energy is a broadband signal (e.g. Col. 3:5-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system taught by Smith and Cretin to make the seismic energy a broadband signal as taught by Nelson. The advantage of this would be a system with signals that extend throughout a frequency range and covers several octaves.

**Claim 30:** Smith and Cretin teach the limitations of claim 23. Referring to claim 30, they do not teach energizing the vibratory source to impart seismic energy through the anchor to the formation by energizing the vibratory source causing a driver coupled to the vibratory source to impact the anchor, the anchor comprising a slip anvil, and imparting a broadband signal through the anchor to the formation. Nelson teaches energizing the vibratory source to impart seismic energy through the anchor to the

formation by energizing the vibratory source causing a driver coupled to the vibratory source to impact the anchor, the anchor comprising a slip anvil, and imparting a broad band signal through the anchor to the formation (e.g. Col. 7:23-44).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system taught by Smith and Cretin to energize the vibratory source to impart seismic energy through the anchor to the formation by energizing the vibratory source causing a driver coupled to the vibratory source to impact the anchor, the anchor comprising a slip anvil, and imparting a broad band signal through the anchor to the formation as taught by Nelson. The advantage of this would be a system capable of producing a multiplicity of signals in repetition.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith as applied to claim 18 above, in view of Nelson (U.S. Patent 4,188,610).

**Claim 20:** Smith teaches the method of claim 18. Referring to claim 20, Smith does not teach controlling the frequency of operation of the vibratory source with a control unit, the control unit having processor acting according to programmed instructions, the control unit controlling the frequency of the vibratory source in response to the sensed parameter of interest. Nelson teaches controlling the frequency of operation of the vibratory source with a control unit (Fig. 21), the control unit having a processor acting according to programmed instructions, said control unit controlling the frequency of the vibratory source in response to the sensed parameter of interest (Col. 21:54-22:10). It would have been obvious to one having ordinary skill in the art at the

time the invention was made to modify the method taught by Smith to control the frequency of operation of the vibratory source with a control unit, the control unit having a processor acting according to programmed instructions, the control unit controlling the frequency of the vibratory source in response to the sensed parameter of interest, as taught by Nelson. The advantage of this would be a method that provides a frequency spectrum with equal level octave bands over a frequency range.

### ***Response to Arguments***

8. Applicant's arguments filed 25 July 2003 have been fully considered but they are not persuasive.

In response to applicant's argument that Smith does not teach determining a subsurface characteristic, Smith teaches determining mud pressure (e.g. Col. 7: 40-49), which is a subsurface characteristic. The limitation "determining a subsurface characteristic" is a broad limitation and does not preclude the examiner from reading measuring mud pressure from meeting this limitation.

In response to applicant's argument that Smith does not teach a surface vibratory source, Smith teaches a strain transmitter, which is located at the surface (e.g. Fig. 1:10; Col. 7: 19-30). Smith further teaches that initial strains of the drill pipe are propagated in the form of acoustic waves. The pulses are transferred through the drill string, to the mud, and from the mud to a geological formation (e.g. Col. 8: 5-14). Acoustic waves are a form of vibration.

In response to applicant's argument that there is no suggestion to combine the Wilson and Nelson references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the examiner referred to Nelson for its teaching of programming instructions for the control unit.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renata McCloud whose telephone number is (703) 308-1763. The examiner can normally be reached on Mon.- Fri. from 8 am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Nappi can be reached on (703) 308-3370. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Renata McCloud  
Examiner  
Art Unit 2837

RDM

  
ROBERT NAPPI  
SUPERVISORY PATENT EXAMINER